

**A NITRIDATION PROCESS FOR INDEPENDENT
CONTROL OF DEVICE GATE LEAKAGE AND DRIVE CURRENT**

ABSTRACT OF THE DISCLOSURE

The present invention provides a method for controlling the gate leakage in a semiconductor device. In one aspect, the method includes placing a semiconductor substrate in a plasma chamber and subjecting a gate dielectric layer located over the semiconductor substrate to a gas mixture including argon and nitrogen under plasma conditions, wherein a gas flow rate of the argon ranges from about 1700 sccm to about 2200 sccm and a flow rate of the nitrogen ranges from about 40 sccm to about 200 sccm.